

REMARKS

Claims 1-16 were examined and reported in the Office Action. Claims 1-10 are rejected. Claims 1-16 remain. Attached hereto is a marked-up version of the amendments to the application as indicated above.

Applicants request reconsideration of the application in view of the following remarks.

I. 35 U.S.C. § 102(e)

Claims 1, 3, 5, 6, 8 and 10 are rejected in the Office Action under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 5,624,606 issued to Wilson et al. ("Wilson"). Applicants respectfully disagree.

Applicants' claim 1 contains the limitations of "a core including crystalline carbon, amorphous carbon or a mixture thereof; and a carbon shell formed around the core, the carbon shell including amorphous carbon with a metal selected from the group consisting of a transition metal, a semi-metal, an alkali metal and an alkali earth metal." Applicants' claim 6 contains the limitations of "a core including secondary particles, the secondary particle being prepared by agglomerating at least one primary particle of a crystalline carbon, an amorphous carbon or a mixture thereof; and a carbon shell formed around the core, the carbon shell including amorphous carbon with a metal selected from the group consisting of a transition metal, a semi-metal, an alkali metal and an alkali earth metal." Therefore, the negative active material of the claimed invention has a core-shell structure. The core includes crystalline carbon, such as graphite, or amorphous carbon, such as soft carbon and hard carbon.

☆ Wilson, however, does not disclose, teach or suggest a core-shell structure as claimed by Applicants. Moreover, in the invention disclosed by Wilson, benzene reacts with SiCl_4 using a chemical vapor deposition (CVD) apparatus. Therefore, the invention disclosed by Wilson results in a Si-C compound instead of a crystalline or amorphous carbon as claimed by Applicants. Further, in Applicants' invention, a

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not in claim
transition metal, an alkali metal or an alkali earth metal (e.g., Si) lies mostly on the surface of the negative active material. (See Applicants' X-ray photoelectron spectroscopy (XPS) results illustrated in Table 2). In contrast, Wilson discloses that Si lies uniformly in the negative active material.

Therefore, since Wilson does not disclose, teach or suggest the limitations contained in Applicants' claims 1 and 6, as asserted above, Applicants' claims 1 and 6 are not anticipated by Wilson. Additionally, since Applicants' claims 3, 5 and 8, 10 directly depend on claims 1 and 6, respectively, claims 3, 5, 8 and 10 are also not anticipated by Wilson for the same reason.

Accordingly, withdrawal of the 35 U.S.C. § 102(e) rejection for claims 1, 3, 5, 6, 8 and 10 is respectfully requested.

II. 35 U.S.C. § 103(a)

Claims 2, 4, 7 and 9 are rejected in the Office Action under 35 U.S.C. § 103(a) as being unpatentable over Wilson in view of no other prior art. It is also asserted in the Office Action that claims 1-10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Wilson in view of U.S. Patent No. 5,772,934 issued to McFadden ("McFadden"). Applicants respectfully disagree.

Applicants' claims 2 and 4 directly depend on claim 1. And, Applicants' claims 7 and 9 directly depend on claim 6. As asserted above, since Wilson does not disclose, teach or suggest the limitations contained in Applicants' claims 1 and 6, Applicants' claims 2, 4, 7 and 9 would also not contain the same limitations. Thus, in absence of the claimed limitations in view of no other prior art containing those limitations, Applicants' limitations contained in claims 2, 4, 7 and 9 would not be obvious to one skilled in the art. Therefore, Applicants' claims 2, 4, 7 and 9 are patentable over Wilson in view of no other prior art.

Regarding the 35 U.S.C. § 103(a) rejection for claims 1-10, as stated above in section I, Wilson does not disclose, teach or suggest a core-shell structure.

McFadden discloses that a transition metal or an alkali metal is used for a negative electrode sheet that can be used in a non-aqueous battery. McFadden does not disclose, teach or suggest, nor relate to a negative active material for a rechargeable battery. Further, McFadden does not disclose, teach or suggest the limitations contained in Applicants' claims 1 and 6 of "a core including crystalline carbon, amorphous carbon or a mixture thereof; and a carbon shell formed around the core, the carbon shell including amorphous carbon with a metal selected from the group consisting of a transition metal, a semi-metal, an alkali metal and an alkali earth metal" and "a core including secondary particles, the secondary particle being prepared by agglomerating at least one primary particle of a crystalline carbon, an amorphous carbon or a mixture thereof; and a carbon shell formed around the core, the carbon shell including amorphous carbon with a metal selected from the group consisting of a transition metal, a semi-metal, an alkali metal and an alkali earth metal," respectively. Since neither Wilson nor McFadden contain the limitations contained in Applicants' independent claims 1 and 6, there would be no motivation to modify Wilson with the teachings of McFadden since the combination would still not arrive at Applicants' claimed invention.

Thus, since neither Wilson nor McFadden teach, disclose or suggest the limitations of Applicants' claims 1 and 6, Applicants' claims 1 and 6 are not obvious over the combination of Wilson in view of McFadden. Additionally, the claims that depend on claims 1 and 6, namely claims 2-5 and 7-10, respectively, are also not obvious over Wilson in view of McFadden for the same reasons.

Accordingly, withdrawal of the 35 U.S.C. § 103(a) rejection for claims 2, 4, 7 and 9 as being unpatentable over Wilson in view of no other prior art, and the 35 U.S.C. § 103(a) rejection for claims 1-10 as being unpatentable over Wilson in view of McFadden are respectfully requested.

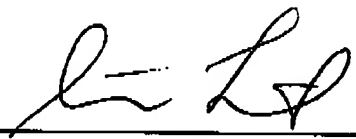
CONCLUSION

In view of the foregoing, it is believed that all claims now pending, namely 1-16, patentably define the subject invention over the prior art of record and are in condition for allowance and such action is earnestly solicited at the earliest possible date.

If necessary, the Commissioner is hereby authorized in this, concurrent and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2666 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17, particularly extension of time fees.

Respectfully submitted,
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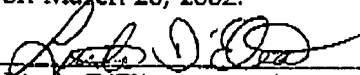
Dated: March 26, 2002

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CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office, BOX Non-Fee Amendments, Commissioner for Patents, Washington, D.C. 20231, on March 26, 2002.


Linda D'Elia March 26, 2002

Attachment: Version with markings to show changes made.

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION

A new paragraph has been added after line 9 on page 6 as follows:

Figure 4 illustrates a sectional view showing a structure of the negative active material of one embodiment of the present invention.

The paragraph on page 6, beginning on line 11 has been amended as follows:

As shown in Figure 4, A-a negative active material of the present invention includes a core A and a carbon shell B formed around the core. The core includes a crystalline carbon, an amorphous carbon and a mixture thereof, and the carbon shell includes an amorphous carbon and metals. The carbon shell has neither an amorphous structure nor a crystalline structure, but instead has an intermediate structure between an amorphous structure and a crystalline structure, resulting in improved capacity and efficiency.